

An Analysis on Open Spaces in Kathmandu Valley from Disaster Management Perspectives

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Abstract

Open spaces are crucial urban resources, however, their importance is felt only when they are actually needed, especially when disasters strike. The decreasing usable area of open spaces especially in a rapidly urbanizing and disaster-prone area like Kathmandu is an indication of extreme difficulty in post-disaster crisis management. So, it is better to be prepared beforehand than waiting for it and also we must have plans for people who survive the disaster so as to regulate and check epidemics and famines which can happen after a disaster event. So, there is a need to strengthen the disaster management capability and therefore the foremost step towards disaster preparedness is to identify the possible open spaces where people may be kept safe during and after the disaster. This research aims to check and evaluate such open spaces within the valley to understand whether or not they are suitable for use during emergencies, whether or not they have the standard to become emergency open spaces and thereby strengthen the emergency preparedness of those areas and provide the community with a pre-identified response planning framework.

Keywords

Open space, Disaster Management, Preparedness, Parameters

1. Introduction

In this study, the open spaces refer to the free spaces which can be used for humanitarian response and recovery where camps for displaced populations, logistic centers, distributing centers can be built. [1]. Identification and protection of open spaces in a disaster-prone city like Kathmandu considerably contribute to a simpler and coordinated response, saving lives and assisting recovery. Pre-identification and infrastructure development in such open spaces can help the community, government, and other humanitarian organizations to respond quickly and effectively following any kind of disastrous event.[2].

Open spaces can save the lives of thousands of people; however, their significance is usually recognized only after a disaster situation. Thus, it tends to be a phenomenon that open spaces are taken for granted until the necessity arrives. Open spaces have been gradually reduced, encroached, transformed into non-usable areas, or heavily built up. This decrease in the usable area of open spaces in Kathmandu Valley

can be taken as a prediction of utmost difficulties in post-disaster crisis management. Hence, the preservation of suitable, easily accessible open spaces should be prioritized before these spaces are completely exploited.

Understanding the quality and quantity of probable shelter sites is a crucial piece of planning before any kind of disaster strikes [3]. The current urbanization trend and rapid population increment both increase the necessity for more open space and reduce its supply which may be a very dangerous scenario. Moreover, all available open spaces cannot be used in the post-disaster scenario for accommodating shelter and other utilities: waterlogged open spaces can be an example. Thus to be able to be used for disaster management there must be some specific criteria for proposing an open space for humanitarian purposes.

2. Need for the Research

Disasters are inevitable and we don't know when it happens So, it is better to be prepared beforehand than

waiting for it and also we must have plans for people who survive the disaster to regulate and check epidemics and famines which can happen after a disaster event. So, there is a need to strengthen the disaster management capability and therefore the foremost step towards disaster preparedness is to identify the possible open spaces where people may be kept safe during and after the disaster. Also, because the open spaces within Kathmandu were identified in the year 2013 and endorsed within the same year, their effectiveness in a post-disaster context had not been tested till the Gorkha Earthquake in the year 2015. During the Gorkha earthquake, some open spaces were fully utilized while some remain unused. This situation has arisen some serious questions:

1. Was the selection of the open spaces done in a scientific way?
2. Was sufficient consideration given to the important aspects of the post-disaster management of open spaces like ownership, access to the site, accessibility, and proximity from the settlement areas under consideration?

There must be some specific criteria that these open spaces should fulfill to be able to be used for humanitarian purposes in an occurrence of a disaster. Knowing the particular criteria to identify the open spaces for humanitarian purposes will help in categorizing the open spaces that are capable of functioning well during emergencies and thereby strengthen the emergency preparedness of those areas and provide the community, local governments, and partner agencies with a pre-identified response planning framework.

3. Problem Statement

The day by day increasing population of the Kathmandu Valley is occupying the privately-owned open spaces with built forms. The densely occupied areas lack open spaces where people can gather safely just in case of disaster. If a large-scale disaster of any kind occurs again in Kathmandu, similar to that of an earthquake of 2015 or urban flooding, people are forced to find safe open spaces nearby. Also since all the identified open spaces in the valley weren't effectively used during the Gorkha Earthquake 2015, the reason for this should be found for their proper

function in the future days. For those open spaces that didn't perform well during an emergency, a rethinking or re-assessment based on certain scientific criteria is a must, while for those that catered well during emergencies effective preservation and development plans should be prepared and established.

So, for new open spaces to be used during emergencies they should be evaluated based on adequate site selection procedures to ensure access to services and livelihood and to identify vulnerability to natural hazards. Similarly, for already identified open spaces, their viability to function as emergency centers should also be made. Also, detailed surveys are required to identify specific requirements needed for environmental protection, enabling works, and other infrastructure needed in the area before the use of such areas as an emergency shelter.

4. Objective of Study

1. To identify the parameters to define an open space as an emergency shelter.
2. To analyze open spaces in Kathmandu valley for disaster management based on the identified parameters.
3. To propose appropriate strategy for the identified open spaces for long term purposeful use.

5. Literature Study on Open Space

An open space for disaster management is an area that is easily accessible to the public and within which any kind of structure like buildings aren't developed. They include parks, schools, streets, public seating areas, etc. [4]. Public Open spaces are where people can discover the value and benefit of public life. These authenticate the city's image and identity[3].

5.1 Open Spaces for Disaster Resilience

Open spaces are needed to meet the demand for emergency food, water, sanitation/ WASH services as well as emergency evacuation sites. Pre- identification of these sites help in being used as a temporary meeting point immediately after any kind of disaster, they can be used for the immediate treatment of needy people, and can be used for foreign assistance management which are very crucial for any

emergency management at the local level. The health, safety and dignity of the displaced population can be protected by better planning and adequate provision of services of post-disaster shelter sites. Inadequate access to health services, drainage, sanitation, water supply, or protection from the weather can greatly increase the risk of disease within a camp.

Carmona’s open space definition raised two important points; accessibility and use. Since this study focuses on identifying the use of the open space by the public to enhance disaster resilience, particular consideration needs to be given to the open spaces which are accessible to the public and which can be used by the public. [5]

5.2 Historical Use of Open Spaces

Tudikhel, the open space in the heart of Kathmandu was used for shelter and relief operations during 1934’s 8.4 magnitude earthquake that caused damage to 60 percent of the buildings within the valley. The same space was once again used as a campsite during 2015 Gorkha earthquake. This has actually shown the usefulness and importance of Kathmandu Valley’s open space time and again.

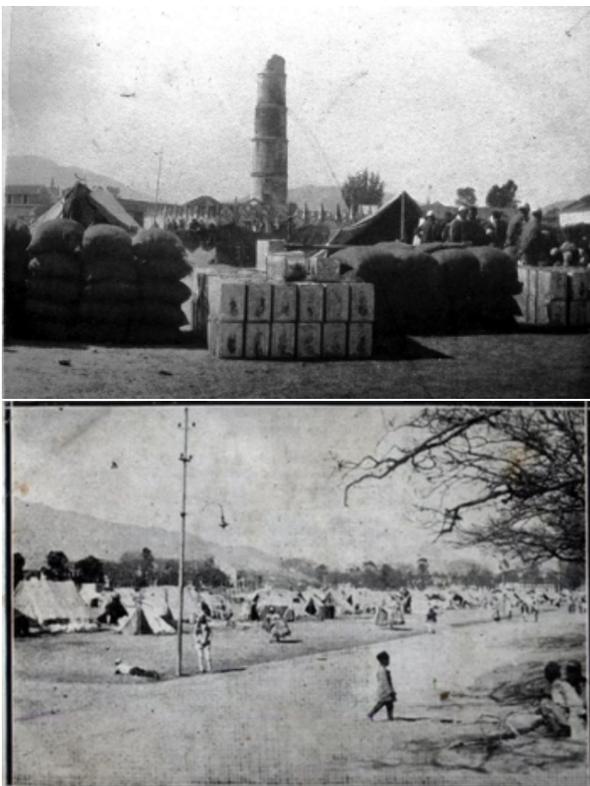


Figure 1: During 1934 earthquake Tundikhel and Dharahara area used as shelter and relief center. (Source: Madan Pustakalaya)



Figure 2: Tundikhel once again became a camp site after the 2015 earthquake (Source: Internet)

5.3 Open Spaces within Kathmandu

Kathmandu Valley Development Authority’s publication ‘Atlas of Open Spaces in Kathmandu Valley’ in the year 2014 had identified 488 open spaces within the valley and the Home Ministry declared 83 of those open spaces to be used in an event of a disaster. Those 83 open spaces was endorsed by the Council of Ministers and was published in the national gazette in April 2013, describing the locations of those open spaces and the rules set forth around the open spaces in an event of a disaster.

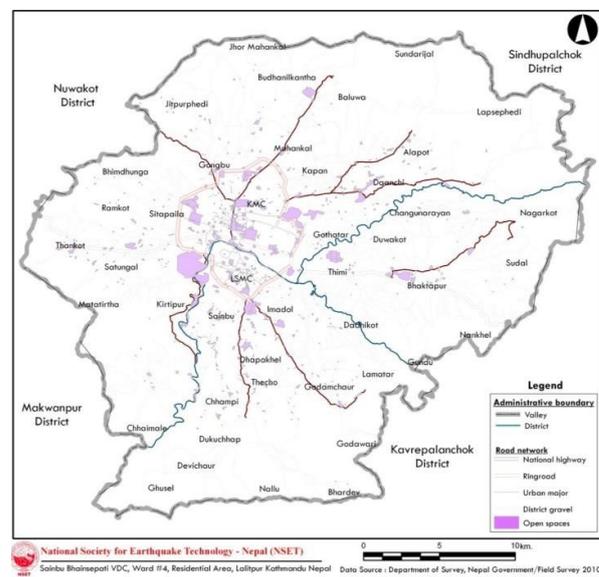


Figure 3: Public open spaces in Kathmandu Valley (Source: NSET)

5.4 Open Space versus Suitability for Disaster Risk Management

Pre-event planning and preparedness for emergency shelter placement are crucial for ensuring a

coordinated response during the complex and changing risk contexts after any disaster. The identification and provision of suitable areas for emergency shelters before any disaster is one of the important strategies to enhance the preparedness for response. This is even more of concern in urban contexts where the availability of such areas is often limited and there is a forever increase in demand for risk-sensitive land use planning. Planning for emergency shelter placement is based on standards, criteria, and guidelines developed for emergency managers and humanitarian organizations which are developed based on post-disaster assessments of previous disasters. For instance, the SPHERE Project provides minimum standards and general guidance to be used in any of several response scenarios and includes provisions for strategic planning, settlement planning, covering living space, construction, and environmental impact for shelter and settlements/[3]

5.5 Lessons Learnt on Issues to Consider for Site Selection for Disaster Management

1. The ownership of the location should be identified and verified and therefore the site should be easily accessible by all.
2. The location should be safe from risks like floods, environmental hazards, high-speed winds, etc., and should be free from the risk of fire or explosive remains.
3. Safe and easily accessible road is a pre-requisite for effective use of the site by displaced population as well as humanitarians.
4. Seasonal and climatic conditions should not affect the accessibility to the site for ease of use by both the displaced population as well as the humanitarians.
5. The site located near the community, social services, and other required facilities like education, health, market prove to be more efficient in catering to the needs of the displaced population.
6. The selected site should meet the minimum SPHERE standards of living conditions and should respect the dignity of the displaced.
7. The site should have a water storage capacity (both potable and non-potable) to fulfill the water demand of the displaced.
8. Sufficient amount of light should be available in and around the site for safety and security reasons.
9. Proper sewage system helps in maintaining health and hygiene around the site.
10. In the case of existing structures in the site, they should be safe and meet national construction standards
11. The area of the site should be sufficient enough to permit proper separation of living units and the capacity of the site should be finalized based on it.
12. Participatory approach in site selection process helps to better communicate/ aware the people about the provision of such space to be used during emergencies. The ownership of the location should be identified and verified and therefore the site should be easily accessible by all.

6. Results and Discussion

6.1 Parameters to Define an Open Space as Emergency Shelter

Through the analysis of the available documents and literature review to identify the possible parameters to define an open space as emergency shelter, following categories are developed:

1. Service Availability
 - Accessibility to site
 - Infrastructures
 - Security and Protection
 - Education and Health Services
 - Relief Services
2. Land Suitability
 - Land Ownership
 - Land Slope/Gradient
 - Trees/Vegetation
 - Drainage
3. Socio-cultural Consideration
 - Proximity to Homes of Affected People
 - Previous Land Use and Compatible
 - Neighboring Land Use

4. Disaster Risk Reduction

- Geological Hazards
- Hydro-Meteorological Hazards
- Secondary hazards

5. Ecological and Cultural Heritage Considerations

6.2 Results and Discussion on Survey

A total of 50 respondents were surveyed through the purposive random sampling technique during the research. The main focus of this analysis was to understand the user perception towards the use of public open spaces during the disaster. The result is categorized into the four sites identified parameters.

LAND SUITABILITY	Land Ownership	Although all the sites were either Public/Government owned, they belonged to different institutions who carried out constructions according to their need decreasing the available open spaces.
	Land Slope/ Gradient	All the sites under consideration had stable and secure land gradient.
	Trees/vegetation	The sites under consideration didn't have obstructing trees in the site that could hamper in shelter construction. However in some of the site tall trees were around the boundary which was a point of concern for the disaster victims.
	Drainage	Three sites had issues of drainage and ponding which was a problem for shelter construction.
	Ecological and Cultural Heritage Considerations	The sites under consideration were located away from environmentally and culturally protected or fragile areas.

Figure 4: Result Categorization(Land Suitability)

SOCIO-CULTURAL CONSIDERATION	Proximity to Homes of Affected People	The survey showed people preferred to remain close to their homes. Most of the people went back to their houses to check timely.
	Previous Land Use	No known pre-disaster land use that could affect the health of people or their willingness to live there.
	Compatible Neighboring Land Use	Sites are located away from areas that could have psychological effect on the disaster victims.
	Livelihoods	The sites have access to markets, public transport and sources of livelihoods for early recovery of disaster victims.
	Awareness to the Users	Majority of the surveyed population were not aware of the open spaces allocated by MoHA for use during emergencies which shows a need of awareness campaign for proper use of the identified open spaces.

Figure 5: Result Categorization(Socio-Cultural Consideration)

SERVICE AVAILABILITY	Accessibility to site	All the sites were easily accessible after the disaster.
	WASH Facilities	Only one of the site had piped water supply provision. On other sites the water was supplied either by water tanks provided by Local Community or NGOs or by providing bottled water. However there were issues of odor, taste and suspended solids on the provided water on some of the sites. 8 of the sites had existing toilets and a temporary toilet had to be installed on one of the site. Except 3 sites the condition of the toilet were said to be satisfactory.
	Electricity	The electricity provision was not available on all the sites. Out of the 9 sites surveyed only 5 had the provision of electricity, however the light was insufficient which was also a concern from security perspective.
	Security and Protection	Although almost all the sites were in close proximity to police station, only 6 sites had on site security and protection provision. Despite of security provision security incidents such as thefts were reported in some of the site.
	Education	Although all the sites are in close proximity to educational institutions only 3 sites had access to formal/informal education services for children from displaced households.

Figure 6: Result Categorization(Service Availability)

CONSIDERATION FOR DISASTER RISK REDUCTION	Geological Hazards	No known geological hazard was reported on any of the site.
	Hydro-Meteorological Hazards	No known hydro- meteorological hazard was reported on any of the site.
	Secondary Hazards	Five of the sites had issues of high rise buildings and tall trees near to the site.

Figure 7: Result Categorization(Consideration for disaster risk reduction)

6.3 Analysis of Open Space in Kathmandu Valley for Disaster Management Based on The Identified Parameters

For the analysis of open spaces, a cross section through Kathmandu and Lalitpur as shown in figure 8 was taken and analysis was done along the cross section.

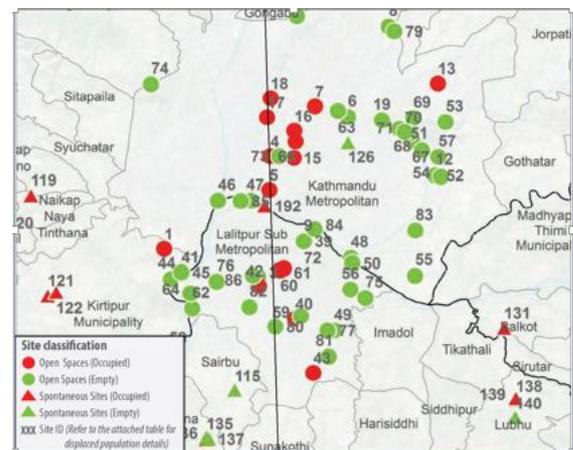


Figure 8: Data Source: IOM, OCHA, SRTM, Creation Date: 22-May-15

SUMMARY SHEET (Suitable/ Unsuitable from DRM Perspective based on Identified Parameters)							
Site ID	Open Space	Service Availability	Land Suitability	Socio-Cultural Consideration	Consideration for Disaster Risk Reduction	Used/ Unused during Gorkha Earthquake	Conclusion
18	Social Welfare Council Election Commission Office	Suitable	Suitable	Suitable	Unsuitable	Used	Secondary hazard exists at the site.
17	Raina Park/ Tudikhel	Suitable	Suitable	Suitable	Suitable	Used	Site suitable for disaster management.
4	Rastriya Sabha Ghina	Suitable	Suitable	Suitable	Suitable	Unused	Site suitable for disaster management however an easy access into the site should be ensured due to the fencing provided around the site.
73	Padma Kanya Campus	Suitable	Suitable	Suitable	Unsuitable	Used	Secondary hazard exists at the site.
66	Dasrath Stadium	Suitable	Suitable	Suitable	Unsuitable	Used	Secondary hazard exists at the site.
5	St. Xaviers	Suitable	Suitable	Suitable	Suitable	Used	Site suitable for disaster management.
3	Lalitpur Municipality Office	Suitable	Suitable	Suitable	Suitable	Used	Site suitable for disaster management.
60	Madan Smarak	Suitable	Suitable	Suitable	Suitable	Used	Site suitable for disaster management.
61	Logankhel Stupa	Suitable	Suitable	Suitable	Suitable	Unused	Site suitable for disaster management however an easy access into the site should be ensured.
59	Logankhel Football Ground	Suitable	Suitable	Suitable	Suitable	Used	Site suitable for disaster management with certain improvements.
40	Ringroad Saldobato Ekantakuna	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unused	Conversion of whole of the site area into road has led to lack of open space.
80							

Figure 9: Result Categorization

The analysis shows that not all identified open spaces show equal potential for use in an emergency and the set of defined parameters help in knowing whether the

open spaces are useful during an emergency or not. The site should be selected with respect to considerations on different sectors such as WASH, protection, and supply and should be based on the consultation with the technical experts such as hydrologists, environmental engineers, surveyors, planners, and engineers. Inappropriate site selection or failure to develop sites to standards can result in further displacement of the affected population causing unnecessary further loss and distress among the persons of concern and may put the population at further risk.

6.4 Strategies that can be Adopted for Long Term Purposeful Use of Open Spaces

- The ownership of the identified open spaces should be taken under a proper domain (either disaster management authority or local authority) ensuring that no new construction shall be carried out there and no encroachment will happen in the land.
- The maximum capacity of the open spaces shall be defined and the proper master planning and camp planning with the planning of necessary services shall be properly done and documented.
- The operation mechanism of the open spaces shall be clearly defined so that the site can immediately be used in necessary situation.
- Regular testing and verification of the services provided at the site should be carried to ensure the proper serviceability of the sites at times of emergency.

7. Conclusions

Thus, the open space to be used during a disaster should be identified based on some scientific evidence.

All available open spaces cannot be used in the post-disaster scenario and only a set of specific parameters help in identifying open spaces useful during a crisis. Appropriate site selection measures must be adopted to ensure easy accessibility to basic services, livelihoods and to identify any kind of vulnerability existing in the area. Moreover, detailed site surveys help in identifying site-specific requirements for environmental protection and other works of infrastructure and services needed to be carried out before the use of such areas as emergency shelters, so that at time of emergency priority is on relief activities rather than making arrangements for infrastructure. Public awareness campaigns about allocated open spaces are required for proper use during emergencies.

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